MCA 206 Mathematical Computing

Module 1 BASIC SET THEORY (10 hours)

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination - Relations- Properties of relations - Matrices of relations - Closure operations on relations - Recurrence relations- Functions - injective, subjective and objective functions.

Module 2 MATRIX ALGEBRA (10 Hours)

Matrices, Rank of Matrix, Solving System of Equations-Eigen Values and Eigen Vectors- Inverse of a Matrix - Cayley Hamilton Theorem

Module 3 MATHEMATICAL LOGIC (10 Hours)

Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives - Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus - Predicate calculus.

Module 4 (10 Hours) Topics in Graph Theory:

Basic terminology, Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring. Trees: definition and properties, tree traversals— preorder, inorder, postorder, binary trees, spanning trees, cut sets, Graph traversals — BFS and DFS, Minimum cost spanning trees- Prim's and Kruskal's algorithm, Shortest paths in weighted graphs- Dijkstra's algorithm.

Module 5 (06 Hours) (as per choice of faculty)

Introduction to Maple

a) Symbolic and numerical computation
b) Graphing
c) Maple worksheets
d) Variables, expressions and functions

Recurrence relations:

a) Fibonacci numbers.
b) Solving recurrence relations.
c) Stability of numerical computations.
d) Approximation of functions.

Use of MATLAB

Portion covered can be tested through Internal evaluation only not to be included in

University examination)

REFERENCES:

1. Kenneth H.Rosen, " Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition, 2002 (Unit 1,2 & 3).

2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. (Unit 4,5)

3. A.Tamilarasi&A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers,2nd Edition 2005.

4. M.K.Venkataraman "Engineering Mathematics", Volume II, National Publishing ompany, 2nd Edition,1989.

5. JurajHromkovic, "Theoretical Computer Science", Springer IndianReprint, 2010.

6. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.

7. Maple 14 at the Maple soft web store